Fueling Green Debate: Creating Student Reading Lists for Environmental Science Debates Using RefShare

Erin O'Toole and Carl Adkins

University of North Texas Libraries, Denton, Texas, USA

Introduction

The University of North Texas (UNT) has a proud tradition of educating students and the Dallas-Fort Worth Metroplex community about environmental science. The Environmental Education, Science and Technology Building, completed in 1998, houses 14 programs related to environmental science (Research/Outreach, 2011). One of the best-known programs is the Elm Fork Education Center (EFEC) (Elm Fork, 2011), which designs and conducts environmental science programs for elementary school students. More than 22,000 students per year from the Dallas-Fort Worth area visit the EFEC for environmental science tours or participate in the Center's field trips (J.H. Kennedy, personal communication, January 5, 2011).

An assistant professor in the Biological Sciences Department at UNT was on the team that developed the EFEC and its curriculum, and served as Associate Director for Education from 1997 through 2003 (Research and history, 2011). Besides still being involved with EFEC activities, this professor teaches the university courses, Biology for Educators, Research Methods for Secondary Science Instruction, and Environmental Science. She is passionate about teaching future science educators to be knowledgeable, responsible teachers of science information, particularly about conservation of the environment. Her doctoral research investigated how to improve learning outcomes in science in-service training, and she continues that research today at the Science Education Research Laboratory.

The UNT Libraries were presented with an opportunity to collaborate with the assistant professor on green education in the spring semester of 2009. She wanted to incorporate active learning in future semesters of the Environmental Science course by having students' debate topics germane to an understanding of environmental science, specifically evolution and global warming. She contacted the library liaison to the Biological Sciences Department, Erin O'Toole, and asked her to develop lists of potential readings to prepare the students for debate. O'Toole recruited Carl Adkins, a graduate library assistant and master's student in UNT's Department of Library and Information Sciences, to assist her with the project. The authors also recognized the opportunity to introduce the professor to a paperless, green approach to gathering, sharing and discussing potential readings by using the bibliographic management software RefWorks and its collaboration feature, RefShare.

Selection of Appropriate Readings

Biology 1132: Environmental Science at UNT is a high-enrollment, freshman-level course in the Biological Sciences Department. The course does not count toward the Biology major, but is in the category of Natural Science courses that fulfill core curriculum requirements. Additionally, several of the teacher certifications offered on campus require this course, so many education majors end up taking the course. These factors explain the popularity of the course, which is composed of four lecture sections that divide up into 29 laboratory sections once a week. Approximately 600 students take the course per semester. Thus, the biology professor presented the UNT Libraries with the perfect opportunity to positively impact the environmental education of a large population of students through the selection of potential debate readings.

The professor set out a few criteria for the readings on evolution and global warming. Naturally, she wanted readings that represented both sides of these controversial issues for the purposes of debate. The readings also needed to be appropriate for a freshman audience and particularly for students destined for majors other than Biology. Finally, she wanted the readings to come from authoritative, scientific sources. The last criterion proved to be trickiest in gathering the evolution readings, as the authors were to discover.

O'Toole has worked as a reference librarian at the UNT Libraries and has been the library liaison for the Biological Sciences Department for nearly seven years. Based on her familiarity with the biology reference and general collections, the author was certain that the Libraries already owned the materials the authors would need to compile evolution and global warming readings. The project was more a matter of setting up guidelines for the literature search and teasing out the best readings for the Environmental Science students.

The authors arrived at the following guidelines for the debate readings search:

1. The readings should target an audience with a 10^{th} to 12^{th} grade reading level. Freshmen generally do not have the background to understand advanced biological terminology.
2. The readings should be secondary sources whenever possible. Freshmen generally do not have the background to understand research studies, which also tend to be narrowly focused.
3. The arguments in the readings should be based on scientific principles and evidence. The biology professor did not want the debates to wander into the arena of beliefs.
4. The readings should be short because the students would need to read multiple sources to prepare for the debate. The target was three to five pages.

The authors searched the online library catalog first to identify monographs and reference works. Initial keyword searches identified the most relevant Library of Congress (LC) subject headings for the topics. The team also searched for review articles with a general audience treatment of the scientific support for and against evolution and global warming. The literature search encompassed these electronic databases: Academic Search Complete (Academic, 2011) and Environment Complete (Environment, 2011) from EBSCOhost, and Opposing Viewpoints in Context (Opposing, 2011) from Gale Cengage Learning. Table 1 below shows the most relevant subject headings for the catalog, Academic Search Complete, and Environment Complete.

Table 1. Relevant Subject Headings for Locating Evolution and Global Warming Readings

Topics:	LC Subject Headings	Database Subject Headings
Evolution	Creationism Evolution Biology Evolution Biology Encyclopedias Intelligent Design Teleology	Creationism Evolution Evolution Biology Intelligent Design Teleology
Global Warming	Climatic Changes Global Warming	Climatic Changes Global Warming

The authors narrowed the database searches by combining the above subject headings with the keywords, “controversy,” “debate,” and “review” in Boolean statements. For example, they used the search string, [evolution AND (debate or controversy) AND review]. An alternate approach in Academic Search Complete is to refine the results by the publication type, “review,” after the initial search.

Opposing Viewpoints in Context (OVC) is organized into broad topic areas that include viewpoints, reference works, journal articles, newspaper articles and more. This resource is more easily searched by first browsing for the desired issue, and then searching for the material type of choice. OVC and the print *Opposing Viewpoints* series proved to be good sources for debate readings on global warming, but not for evolution because the viewpoints opposed to evolution were mainly based on religious beliefs, rather than scientific evidence.

After compiling the potential readings, the authors identified the types of sources that best met the guidelines for the Environmental Science course. The sources listed in Table 1 were suitable for both topics.

Table 2. Sources Suitable for Evolution and Global Warming Readings

Sources for Readings on Evolution and Global Warming	Basis for Suitability
Entries in science reference works	Entries in many science encyclopedias and handbooks are short, written for a high school audience, and based on scientific evidence.
Introductions to science reference works	These sources often discuss both sides of a controversy, are written for a high school audience, and are based on scientific evidence.
Opposing Viewpoints, print series – the suggested readings following the viewpoints	Many of the suggested readings are short, written for a high school audience, and based on scientific evidence.
Review, panel or interview articles	These articles are generally written for a high school audience and discuss both sides of the controversies.

O'Toole found it challenging to locate appropriate readings in support of creationism or intelligent design. Scholarly science journals appear to publish few research papers by scientists, such as Michael Behe and William Dembski, who represent the intelligent design school of thought perhaps because the peer reviewers find fault with their scientific methods (Espinosa, 2010; Gold, 2007). Thus, she turned to chapters from books by the intelligent design scientists, and science magazines written for a more general audience, specifically *American Biology Teacher* and *Natural History*, the latter being published by the American Museum of Natural History. In addition, a reference book of primary sources proved to be a rich source of manageable excerpts on the evolution controversy. *Evolution and Creationism: A Documentary and Reference Guide* edited by Christian C. Young and Mark A. Largent contains one to five page excerpts of primary documents from the major figures and institutions in the evolution debate preceded by contextual comments (Young & Largent, 2007).

Surprisingly, sources that were not suitable for the evolution debate readings were the viewpoints in OVC or *Opposing Viewpoints* print series. Most of the viewpoints opposed to evolution were based on religious beliefs, which did not meet the professor's requirement for arguments based on scientific evidence. Sources that did not meet the requirements for the

global warming debate readings were primary and secondary sources that delved into economic analyses of global warming. The advanced terminology and statistics used in such articles were inappropriate for a freshman audience.

The authors compiled the lists of potential debate readings, annotated individual readings for the biology professor's elucidation, and delivered the lists approximately three weeks after they were requested. The two lists are included as Appendix A. Upon receiving the list of evolution readings, the professor responded: "Wow, Erin!!! This is great!! You know, I haven't used RefWorks but would like to. Is there a steep learning curve? (personal communication, May 18, 2009). She eventually used eight readings in the Environmental Science course, which are indicated on Appendix A. The professor reported in later emails that the students' first debate went very well (personal communication, October 16, 2009), and that she has continued to use the readings in the course since fall 2009 (personal communication, November 1, 2010). She has decided to have one debate per semester and will eventually alternate between the topics of evolution and global warming. Therefore, she has not used the global warming readings yet, but plans to in Fall 2011 (personal communication, January 19, 2011). The authors considered their impact on the education of the Environmental Science students a success, but were they successful in encouraging "green" collaboration by introducing the assistant professor to the use of RefWorks and its feature, RefShare?

Collaboration Using RefShare

The UNT Libraries have subscribed to the bibliographic management software RefWorks since 2007 (RefWorks home). Access to the resource is through the Libraries website and is available to all UNT students, staff and faculty. Despite marketing, a substantial number of faculty and students are still not aware that RefWorks is available for their use, so UNT librarians take advantage of any opportunity to introduce faculty to the resource. The biology professor's request for debate readings was such an opportunity.

RefWorks was central to collaborating with her throughout the process of developing reading lists for debate in the Environmental Science course. The authors used the software to store references and readings, annotate the references, and share them with each other and the professor. The project was completed without printing one sheet of paper or sending articles as attachments to dozens of emails. With this method of storing and sharing references, the collaboration was green and nothing was lost in the research and evaluation process, which can happen when an email is overlooked or lost.

The UNT Libraries have purchased a RefWorks module called RefShare that allows the researcher to share collected references and accompanying files with collaborators (RefWorks, 2009). The user can email a link to the recipient, granting access to the contents of a folder

designated for sharing. The recipient can view the contents of the folder without even establishing a RefWorks account. The shared folder options in RefShare allow the researcher to control the extent of folder access, including the recipient's ability to make comments on individual references, access attached files, receive email updates, and generate reference lists. Comments pertaining to a specific reference stay with that entry, making it easy to track ongoing discussions when multiple references are involved. RefShare made the process of identifying and sharing readings for a class much easier for the authors to organize, manage, and share with a faculty member.

In the first phase of the debate readings project, the authors created reference folders for the topics of evolution and global warming respectively in their RefWorks accounts. Then they searched the UNT online library catalog, the EBSCOhost databases Academic Search Complete and Environment Complete, and OVC. The UNT Libraries have taken advantage of a RefWorks option to insert export buttons into records in the catalog. On both browsing pages and bibliographic records, a button allows the user to export a title's reference directly to the user's RefWorks account (Figure 1).

Figure 1. Refworks Export Button in UNT Libraries Catalog

If the account is not open already, the RefWorks login screen will pop up once the export button is selected. Many databases also provide an option to export references for articles directly into RefWorks. This is true of the EBSCOhost databases used in this project. At this time, Gale's OVC does not have an option to export references to bibliographic managers. Any references from OVC had to be entered manually into RefWorks.

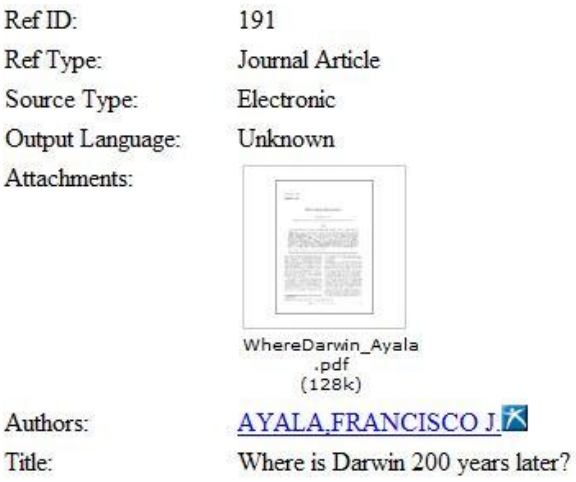
The authors imported references into their RefWorks folders designated for tentative selections for the debate readings. Each individual reference screen in RefWorks contains numerous fields for the information that will be used in the resulting citation, plus fields where users can communicate about the reference. The team chose to annotate the readings in the title field so that the comments could easily be seen on a list screen of abbreviated references, as in Figure 2, rather than having to open each reference entry to read the comments. Of course, the

annotations must later be removed from the title field before a Cited Reference list can be generated.

Figure 2. Annotations in Title Fields of References in RefWorks (see bold font)

Graduate library assistant Adkins shared his folder of tentative readings for global warming with O'Toole through the RefShare module, which gave her editing privileges. She reviewed his initial selections and her own based on the professor's criteria, and transferred the final selections to new RefWorks folders containing 10 to 12 readings each. The team then took advantage of RefWorks' storage capacity of 1 gigabyte per account for files, which can be attached to individual reference records, to gather the full-text of all the readings and attach them to the folders. In keeping with their green goals, print readings were scanned and saved as PDF files, rather than reproduced on a copying machine. The researchers then attached the PDF files to their corresponding reference entries in RefWorks, as shown in Figure 3. The team saved readings from electronic resources to their computer desktops, and then attached them to their corresponding references. The end result was two neatly packaged folders for the biology professor to evaluate, each containing the selected readings, their references, and comments about the readings.

Figure 3. PDF File Attached to a Reference Entry in RefWorks



RefWorks is not alone in providing a collaboration feature for researchers. There are two other internet-based bibliographic manager programs that can be used to share references: EndNote Web from Thomson Reuters (EndNote - bibliographies, 2011), and the open source resource, Zotero (Zotero home, 2010). EndNote Web and Zotero both allow users to share references and set edit or read-only privileges for recipients. Researchers cannot attach files to references in EndNote Web, but can attach both files and images to references in Zotero and RefWorks.

When O'Toole shared the reading folders with the biology professor, she explained the options the professor had for managing the readings and offered to give her individual training in RefWorks if desired. Because she did not receive a reply about the training, O'Toole contacted the professor after several months and asked whether she had continued to use RefWorks. The biology professor made the following comment: "Yes. Thank you for teaching me about these valuable tools!!!" (personal communication, November 1, 2010). Apparently the learning curve was not steep because she was using RefWorks and RefShare without instruction from the author.

Conclusion

The authors successfully selected appropriate readings to fuel debate on the topic of evolution for a freshmen-level environmental science course. This result provides evidence that the selection guidelines were valid for first-year college students who are not biology majors. This selection process could also be applied to readings for high school students because the guidelines and resulting readings would identify materials at the appropriate level for high school students in AP biology courses. Whether the global warming readings will also be suitable for the students will be determined at a later date; however, it is likely the readings will be suitable because they were selected using the same criteria.

Finding readings that supported creationism or intelligent design with scientific arguments proved to be more difficult than expected. Research-based articles on these concepts are rare in mainstream, peer-reviewed scientific journals. O'Toole had to turn to reference books and journals for a more general audience to find the readings required by the biology professor. Surprisingly, the *Opposing Viewpoints* print series was not a good source for scientific arguments. Even the electronic OVC from Gale did not provide the readings sought in either the Viewpoints or Reference categories.

The authors also achieved their green goals of sharing reading lists with a faculty member without using paper, and encouraging the professor to do likewise. They created their initial lists of evolution and global warming readings in the bibliographic manager RefWorks, and then shared their lists with each other using the collaborative feature, RefShare. Once the reading lists were finalized, they shared the lists with the biology professor through RefShare. She was impressed with the organizational capabilities of RefWorks and RefShare, and has used them since her introduction to the software. While introducing groups of faculty members to RefWorks and RefShare would certainly be more efficient, it is next to impossible to get them in one place at one time for a class. The authors hope that this assistant professor will pass the word to other faculty, while they continue to convince one faculty member at a time to give up paper-intensive approaches to gathering readings and sharing them with collaborators.

Based on a presentation at An Amigos Online Conference: Going Green @Your library 2. Working Green, Teaching Green on November 3, 2010.

Appendix A: Recommended Readings for Green Debates

Evolution Readings
Compiled by Erin O'Toole, Librarian
Readings preceded by * were used in the Environmental Science course debate.

Arnhart, L., Behe, M. J., & Dembski, W. A. (2000). Conservatives, Darwin & design: An exchange. *First Things: A Monthly Journal of Religion & Public Life,* (107), 23-31. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=3728280&site=ehost-live&scope=site

Ayala, F. J. (2008). Where is Darwin 200 years later? *Journal of Genetics, 87*(4), 321-325. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=37564603&site=ehost-live&scope=site

Behe, M. (2007). Darwin's black box: A biochemical challenge to evolution (1996). In C. C. Young, & M. A. Largent (Eds.), *Evolution and creationism: A documentary and reference guide* (pp. 262-266). Westport, Conn.: Greenwood Press.

Bleckmann, C. A. (2006). Evolution and creationism in science: 1880-2000. *Bioscience, 56*(2), 151-158. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=20029374&site=ehost-live&scope=site

*Braterman, P. S., & Holbrook, J. B. (2009). Putting Darwin in his place: The need to watch our language. *American Biology Teacher, 71*(2), 84-88. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=36619407&site=ehost-live&scope=site

*Jones, J. E., III. (2007). Kitzmuller v. Dover (2005). In C. C. Young, & M. A. Largent (Eds.), *Evolution and creationism: A documentary and reference guide* (pp. 271-289). Westport, Conn.: Greenwood Press.

*Meyer, S. C., & Campbell, J. A. (2009). Critiques of Darwinian evolution should be taught in science classes. In D. Haugen, & S. Musser (Eds.), *Education* (pp. 154-158). Detroit: Greenhaven Press.

*Moore, R. & Decker, M.D. (2008). Michael Behe. In *More than Darwin: People and places of the evolutionism-creationism controversy*. Westport, Conn.: Greenwood Press.

*Moore, R. & Decker, M.D. (2008). Charles Darwin. In *More than Darwin: People and places of the evolutionism-creationism controversy*. Westport, Conn.: Greenwood Press.

*Moore, R. & Decker, M.D. (2008). William Dembski. In *More than Darwin: People and places of the evolutionism-creationism controversy*. Westport, Conn.: Greenwood Press.

*Moore, R. & Decker, M.D. (2008). Stephen Jay Gould. In *More than Darwin: People and places of the evolutionism-creationism controversy*. Westport, Conn.: Greenwood Press.

*Moore, R. & Decker, M.D. (2008). Lynn Margulis. In *More than Darwin: People and places of the evolutionism-creationism controversy*. Westport, Conn.: Greenwood Press.

*Nelson, C. E. (2009). Intelligent design should not be taught in science classes. In D. Haugen, & S. Musser (Eds.), *Education* (pp. 159-165). Detroit: Greenhaven Press.

*Paley, W. (2007). Natural theology (1802). In C. C. Young, & M. A. Largent (Eds.), *Evolution and creationism: A documentary and reference guide* (pp. 22-27). Westport, Conn.: Greenwood Press.

*Scott, E. C. (2009). Neocreationism. In *Evolution vs. creationism: An introduction* (2nd ed., pp. 119-143). Westport, Conn.: Greenwood Press.

Traynor, L. (2005). What evolution isn't: Creationism's straw men. *Skeptic, 12*(1), 91-94. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=19218267&site=ehost-live&scope=site

Global Warming Readings
Compiled by Carl Adkins, Graduate Library Assistant

Ausubel, K. (2006). The Earth faces an environmental crisis. In D. Dupler (Ed.), *Conserving the environment* (pp. 21-26). Detroit: Greenhaven Press.

Bast, J. (2006). The Earth does not face an environmental crisis. In D. Dupler (Ed.), *Conserving the environment* (pp. 21-26). Detroit: Greenhaven Press.

Bily, C. A. (2006). Introduction. In C. A. Bily (Ed.), *Global warming* (pp. 10-17). Farmington Hills, MI: Greenhaven Press/Thomson Gale.

Downie, D. L., Brash, K., & Vaughan, C. (2009). Problems, controversies, and solutions. In *Climate change: A reference handbook* (pp. 43-62). Santa Barbara, Calif.: ABC-Clio.

Dupler, D. (2006). Introduction. In D. Dupler (Ed.), *Conserving the environment* (pp. 14-20). Detroit: Greenhaven Press.

Edgerton, S. A., MacCracken, M. C., Jacobson, M. Z., Ayala, A., Whitman, C. E., & Trexler, M. C. (2008). Prospects for future climate change and the reasons for early action. *Journal of the*

Air & Waste Management Association (1995), 58(11), 1386-1400. doi:10.3155/1047-3289.58.11.1386

Florides, G. A., & Christodoulides, P. (2009). Global warming and carbon dioxide through sciences. *Environment International, 35*(2), 390-401. doi:10.1016/j.envint.2008.07.007

Gore, A. (2009). Renewable energy is necessary to reduce global warming. In J. Langwith (Ed.), *Renewable energy* (pp. 73-77). Detroit: Greenhaven Press.

Independence Institute. (2009). Renewable energy is economically costly. In J. Langwith (Ed.), *Renewable energy* (pp. 83-87). Detroit: Greenhaven Press.

Lean, G. (2006). Global warming poses a serious threat. In C. A. Bily (Ed.), *Global warming* (pp. 18-26). Farmington Hills, MI: Greenhaven Press/Thomson Gale.

McManus, J. F. (2006). Global warming does not pose a serious threat. In C. A. Bily (Ed.), *Global warming* (pp. 27-36). Farmington Hills, MI: Greenhaven Press/Thomson Gale.

Moser, S. C., & Dilling, L. (2007). Introduction. In S. C. Moser, & L. Dilling (Eds.), *Creating a climate for change: Communicating climate change and facilitating social change* (pp. 1-16). Cambridge; New York: Cambridge University Press.

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Elm Fork Education Center. Retrieved January 10, 2011, from http://efec.unt.edu/

EndNote - bibliographies made easy. (2011). Retrieved January 11, 2011, from http://www.endnote.com/

Environment Complete. (2011). Retrieved January 24, 2011, from http://www.ebscohost.com/academic/environment-complete

Espinosa, A. (2010). Introduction: Protistan biology, horizontal gene transfer, and common descent uncover faulty logic in intelligent design. *Journal of Eukaryotic Microbiology, 57*(1), 1-2. doi:10.1111/j.1550-7408.2009.00459.x

Gold, S. F. (2007). Michael Behe's argument for design. *Publishers Weekly, 254*(16), 25-25. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=24821634&site=ehost-live&scope=site

Opposing Viewpoints in Context. Retrieved January 24, 2011, from http://www.gale.cengage.com/InContext/viewpoints.htm

RefWorks. (2009). *RefShare factsheet English.* Retrieved January 10, 2011, from http://www.refworks.com/content/factsheets/RefShare_Factsheet_English.pdf

RefWorks home page. Retrieved January 10, 2011, from http://www.refworks.com/

Research/Outreach- Institute of Applied Science. Retrieved January 10, 2011, from http://www.ias.unt.edu/research-outreach/

Research and history. Retrieved January 10, 2011, from http://www.biol.unt.edu/~rthompson/research.htm

Young, C. C., & Largent, M. A. (2007). *Evolution and creationism :A documentary and reference guide*. Westport, Conn.: Greenwood Press.

Zotero home. (2010). Retrieved January 11, 2011, from http://www.zotero.org/

Erin M O'Toole <erin.otoole@unt.edu> is a science librarian and Head of the Eagle Commons Library at the University of North Texas.

Carl Adkins Carl.Adkins@yahoo.com is a graduate of the Master's program in Library and Information Sciences at the University of North Texas. Denton, Texas 76203-5017 USA.

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